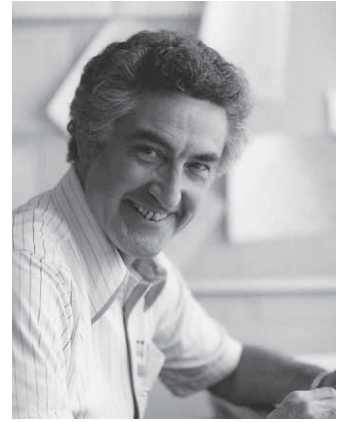


AL HIBBS
1924 – 2003


Albert R. Hibbs, BS '45, PhD '55, known worldwide as "the voice of JPL," died on February 24 at age 78 of complications following heart surgery. Born October 19, 1924 in Akron, Ohio, Hibbs decided as a five-year-old that he wanted to go to the moon. He *did* qualify as an astronaut, in 1967, even though he was seven years over the age limit. He was slated to fulfill his dream on Apollo 25, but the program ended at 17. At Caltech, he studied physics under the Navy's V-12 program. "I wanted to conquer space, and my roommate, Roy Walford, decided that he would conquer death. Together we would then conquer time," he later wrote. (Walford, now professor emeritus of pathology at UCLA's medical school, is an internationally known gerontologist.) In the late 1940s, he and Walford took time off from graduate school at the University of Chicago to "break the bank" in Reno and Las Vegas by exploiting the mechanical quirks of certain roulette wheels, earning them a story in *Life* magazine; their winnings financed a 40-foot sailboat and a year and a half roaming the Caribbean.

Hibbs joined the Jet Propulsion Laboratory, then run by Caltech for the Army, in February 1950. (The Lab was developing guided-missile technology but

the word "rocket" smacked too much of Buck Rogers, so Caltech had coined the euphemism to avoid scaring off potential donors.) As head of the Research and Analysis Section, he was the systems designer for America's first successful satellite, Explorer 1.

When JPL became part of the patrimony of the newborn NASA later that year, he helped draw up JPL's master plan to explore the solar system with unmanned spacecraft. His gift for explaining difficult science in lay terms led to him becoming the radio and television chronicler of the Ranger and Surveyor missions to the moon in the 1960s; the Mariners to Venus, Mars, and Mercury in the '60s and '70s; the Vikings to Mars in the '70s; and the Voyagers to the outer solar system in the '70s and '80s. He also hosted or narrated various programs for NBC and PBS, winning a Peabody in 1963 for the four-year NBC children's series, *Exploring*.

After helping to set up JPL's Space Science Division from 1960 to 1962 and serving as its first chief, Hibbs went on loan as a staff scientist for the U.S. Arms Control and Disarmament Agency, studying how arms-control treaties could be monitored from space. Five years later, he returned to JPL, where he spent the rest of his career working in a

variety of technology programs, earning NASA's Exceptional Service Award and the NASA Achievement Award in the process. He retired in 1986, three years before Voyager 2 reached Neptune.

Hibbs maintained close ties with Caltech, where over the years he taught courses in government, national security, transportation issues, and physics. He took time off from JPL to earn his PhD, supported by his wife, the late Florence Pavin. His advisor was Richard Feynman, another noted raconteur, lockpicker, and thespian, and the two became close friends. They cowrote *Quantum Mechanics and Path Integrals*, a standard text on the subject, and Hibbs wrote the foreword for *Surely You're Joking, Mr. Feynman*.

Hibbs's own unpublished reminiscences, taped by Nicolas Booth, are the source for the account of Explorer 1's launch that follows.

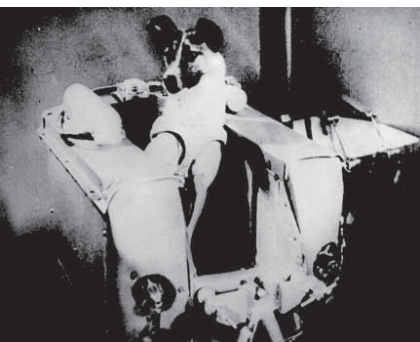
Hibbs is survived by his second wife, Marka; children Victoria and Bart (BS '77); stepchildren Larry Wilson and Alicia Cortrite; sister Agnes Jones; and three grandchildren. Donations may be made to the Caltech Y, Mail Code 158-86, Pasadena, CA 91125. □—DS



A backstage photo of Hibbs as a fishmonger and fellow JPLer Bruce McLaughlin (BS '77) as Motel the tailor in Caltech's February 1980 production of *Fiddler on the Roof*.

ON THE EDGE OF SPACE

BY AL HIBBS



Sputnik 1, launched by the Soviet Union on October 4, 1957, inaugurated the Space Age and scared the bejeezus out of America.

The basketball-sized, 183-pound object passing over our heads once every 96 minutes was a reminder that nuclear bombs could ride on rockets as well. This fear turned to outright terror on November 3, when the half-ton Sputnik II was launched, carrying a dog named Laika, above. Unfortunately, the first Earthling in space had a one-way ticket and died when her oxygen supply ran out a week later.

It was the last Friday of January 1958, and I stood in the gathering gloom of a Florida night outside a small Quonset hut on a windswept sandspit that nobody had ever heard of called Cape Canaveral. America was trailing badly in the Space Race—then just a few months old, during which time the Soviet Union had launched two Sputniks, and our first attempt, Vanguard, had blown up on the launchpad live on television. That had been a Navy project. At the Jet Propulsion Laboratory, we were a contractor to the Army and we didn't want to suffer an equally ignominious episode. I was just 33 years of age.

After Vanguard's failure, a number of politicians complained that we had got the wrong Germans. (After World War II, we had scooped up quite a number of engineers who had worked at Peenemünde on the V-2, the world's first ballistic missile.) In fact, we had got the cream of the crop, led by the redoubtable Wernher von Braun. They were now at the Army's Redstone Arsenal in Huntsville, Alabama. There were so many Germans there that some of the Army people used to refer to it as Hunsville.

Although the Navy had been given the plum job of launching America's first satellite with Project Vanguard's approval back in 1955, the Army had never given up. We called our project the "Reentry Test Vehicle" or RTV, which we claimed was going to test the nose cone for the Army's Jupiter intermediate-range ballistic missile. We'd go well above the atmosphere—

we had enough power to do that—then point straight down and aim at the earth. This would mimic the Jupiter' reentry conditions. We tested it three times, and I recall someone suggesting that we deliberately have a failure—that is, the object we were firing into space would fail to reenter and just stay up there. It was a nice idea!

The Navy knew perfectly well what we were up to, even though the general public didn't. When a local newspaper in Huntsville picked up those innocuous initials and suggested that they stood for "Rocket To Venus," there was an almighty row. It started off a congressional investigation and ended up with us having to hide what would become the first experiment in space in a cupboard at JPL. Eventually, President Eisenhower came to our rescue, appearing on television to announce that he was asking the Army to attempt the launch of a satellite as part of U.S. participation in the International Geophysical Year.

While all this was going on, the head of the Naval Research Laboratory, Admiral Bennett, got up in the midst of a meeting of the Joint Chiefs of Staff and complained that the Army should not be given the job. He felt the Army's launching system was unreliable. The Joint Chiefs were very annoyed, as this was not on the agenda, so they directed him to get together with the Army's chief scientist—a guy named Jones—to discuss the matter.

So a JPL group showed up in Mr. Jones's fancy Pentagon office—walnut table and leather-upholstered furniture. I was there because I had done all the calculations on the probabilities of success and failure. There was also Bill Pickering [BS '32, MS '33, PhD '36], the Lab's director; and Jack Froehlich

[BS '47, MS '48, PhD '50], the project manager. Our opposite numbers also showed up. There was Dr. Hagen from the Naval Research Laboratory, head of the Vanguard project; Bennett; and sitting off to one side another admiral named Clark, who was Bennett's superior in the Office of the Chief of Naval Operations.

Jones opened the meeting, Bennett made his pitch, and then Pickering asked me to give the numbers I had. Statistics is a funny business. It has its own jargon, and I'm afraid I used a bit of it, which Bennett complained about. Froehlich interrupted, giving a very patronizing little high-school lecture about mathematics to Bennett, who got more and more pissed off as it went on. Pickering sank down into his big leather chair, wishing, I guess, that he could separate himself from Froehlich.

At this point, Eberhardt Rechtin [BS '46, PhD '50] entered the room. He was in charge of the radio and tracking system and was never one to hide his light under a bushel. (He later became head of the Defense Advanced Research Projects Agency and then head of the Aerospace Corporation.) Eb listened to about 15 or 20 seconds of the conversation and broke in, saying, "Admiral Bennett, it's perfectly clear you're just trying to throw sand in the air, you're trying to delay and postpone a project which is of vital interest to the country. It seems to me, Admiral, that you are doing something that's quite un-American." Quite a thing to say in an era of McCarthyism! Pickering put his hands over his eyes and sank even deeper into his chair. Admiral Clark rose, straightened his double-breasted Navy uniform and said, "Gentlemen, I don't

think anything further can be accomplished with this conversation.” He then walked to the door and held it open for everybody else to depart, and I heard him say, sort of sotto voce as Eb walked out, “You’ll go far, young man.”

So we were given the go-ahead to launch. There was quite a discussion as to what to name the first satellite. Our feeling came from cards, which was (and probably is) one of JPL’s enduring hobbies. John Small [BS ’41, MS ’46, Eng ’47], head of our upper-stage development group, would often wisecrack, “The winners laugh and joke, while the losers yell ‘Deal!’” So we thought, having lost to the USSR the opportunity to launch first, we should call it Deal. General Madeiras, who was in charge of the program, liked Highball, and the Secretary of the Army was keen on Topkick. In the event, Eisenhower chose Explorer.

But at JPL, the preoccupation with cards stuck. Today, for example, the main tracking controller in the operations building is called “Ace” and his deputy is known as “Deuce.” And a few months before that Pentagon meeting, in the blockhouse at the Cape counting down an RTV launch, there came a period of dead silence as we waited for the telemetry group to give us the go-ahead. Then out of the back room came this raucous voice, “Down for three, you bastards!”

By late January 1958, we were ready to launch Explorer 1. The Army had a Quonset hut several miles from the launchpad, and I occupied one corner of it with my crew. Our job was to do a fast analysis of all the tracking data and predict as early as possible whether the launch had been a success. We had a tracking station at the Cape, but we also needed measurements downrange. The next

station was on the island of Antigua in the eastern Caribbean. Then British bases in Nigeria and Singapore, then Earthquake Valley outside of San Diego. There was nothing more between the West Coast and the Cape.

The Antigua tracking station was Navy-operated. We were allowed to put our receiver on it, although we had to use their antennas, and they never gave us a chance to test the setup. A short while before launch, they threw a switch to send the antenna output to our receiver. The switch was so badly corroded that it didn’t give a signal, but we didn’t know this at the time—the Jupiter had lifted off and the satellite should be visible, so why wasn’t a signal being picked up? It was one hell of a problem and a little too late to start wondering what had gone wrong.

Not only were we losing valuable data, the pressure was on. Froehlich and Madeiras were having kittens across the hall from my crew, and up at the National Academy of Sciences, a press conference was due where Pickering, von Braun, and James Van Allen (who had built the instrument aboard the satellite) were waiting to announce that Explorer 1 had reached orbit.

We could, at least, get two important numbers from the Cape. First was the rocket’s speed in the direction radially away from our receiving station, given by the Doppler shift of the radio signal. Second was the exact time at which the signal cut off as the satellite went over the horizon. We had hoped to get a similar pair of numbers from Antigua, as there was no way of getting real-time data from either Nigeria or Singapore. (Strange as it may seem to posterity, they didn’t have phone or telegraph links with us.) With either of Antigua’s

numbers, we could have done a pretty good job at calculating the orbit. With both, we would have been quite exact. Without them I had to fall back on calculating probabilities.

Given the limited data, I estimated that we had a 95 percent chance of being in orbit. A satellite in a close, circular orbit, say a couple of hundred miles up, will take about an hour and a half to go around the earth. So it would take at least that long before we could get confirmation from Earthquake Valley, where we did have phone contact. I knew perfectly well that the general wanted information before then.

Of course, there were big computers at the Cape, and they were also using radar and radio data to track us. I learned later from the range safety officer that his computers—never very reliable—had indicated that the rocket was going to come down in Tampa. Since we had all watched it lift off as a brilliant point of light in the night sky moving steadily east, he knew that wasn’t the case. He had graciously refused to blow it up, as he would have done if it really was headed toward a Florida city.

After about half an hour, I went in to see Madeiras, and I started giving him the probabilities. He said—and I quote—“Don’t give me any of this probability crap, Hibbs. Is the thing up there or not?” (Madeiras later became an Episcopalian minister. Maybe he liked their probabilities of reaching the heavens better.) Well, the most likely solution was that it was up, with a very high apogee and a satisfactory perigee, so it would probably stay up. My best guess from the little data we had on the upper atmosphere was that it would stay up for about 15 years. So I told Madeiras that we were



Explorer 1 lifted off at 10:48 p.m. on January 31, 1958, on a Jupiter-C rocket, von Braun’s modification of the Redstone ballistic missile that was itself a direct descendant of the German V-2. The Army Ballistic Missile Agency and JPL finished modifying the rocket and built and launched Explorer in just 84 days.

PICTURE CREDITS:
38, 39 – NASA



From left: Pickering, Van Allen, and von Braun hold a model of Explorer 1 and the final stage of its rocket aloft at the press conference. Explorer's payload included a cosmic-ray counter, which discovered the lower Van Allen belt—a zone of charged particles trapped by the earth's magnetic field.

in orbit. Explorer 1 stayed up for a little more than 12 years, so it wasn't too bad a calculation under the circumstances.

After my report, Madeiras and Froehlich took off in an Air Force car for an auditorium at Patrick Air Force Base, where a press conference had already been called. The reporters were sitting around anxiously waiting for somebody to show up and tell them what had happened. I was in one of the last cars to go. While I was waiting, I was overcome by a strange mixture of emotions. I was staring up into the sky, quietly crying, for it was a complete letdown: several years of intense work were over, and, apparently, successfully. My feelings were simply, "We did it!"

At the auditorium, I asked a guy in my group, Chuck Lundquist, on loan from Huntsville, to get in touch with Earthquake Valley and keep the line open. (I was up on stage behind Madeiras, who was going to speak to the press.) Chuck was to come out of the phone booth and signal me as soon as he heard anything. Until then, he was to come out every five minutes and signal "not yet."

We knew it would be a while, because the high

apogee meant the orbit would be longer than 90 minutes. In fact, it was more than two hours. Everybody was getting pretty nervous, even me, although I should have known better—I was the one who had predicted when it should arrive. Madeiras, bless him, trusted me implicitly, and fended questions from the press by saying repeatedly, "Don't worry, we'll hear from it."

Meanwhile, up in Washington, Pickering, von Braun, and Van Allen were on stage and fully aware that 90 minutes had gone by with no sign of the satellite. After 90 minutes, someone walked over to Pickering and said, "Well, better luck next time, Bill, I guess you didn't quite make it, chuckle, chuckle, chuckle." But Pickering sat quietly and said, "I'll wait till my boys tell me that." Of course, I had already told him by phone that it was up, but I think he wanted to be a little more certain.

It was almost two hours after launch that Chuck gave me the sign—thumb and forefinger together in a circle—that all was well. I walked up to whisper the same in Madeiras's ear, and he announced the result to the press and the waiting world. □